

**To:** Lower Willamette Group

**From:** EPA

**Date:** October 13, 2005

**Subject:** Benthic Interpretive Approach for the Lower Willamette River Ecological Risk Assessment

The following memorandum is in response to LWG's July 11, 2005 presentation on a proposed benthic toxicity interpretation approach for the Lower Willamette River/Portland Harbor. EPA and its partners appreciate LWG's efforts in preparing this presentation. This memo provides direction to the LWG on EPA's expectations with respect to the predictive benthic toxicity modeling and analysis for the Portland Harbor site. It is EPA's intent to ensure that our respective interpretive approaches are consistent in specific core areas, particularly with respect to toxicity hit/no-hit determination. This memo also seeks to provide clarity on other aspects of the benthic interpretive approach for Portland Harbor, including reporting, detections for inclusion in the model, data qualifiers, data chemistry preparations, and deliverables. EPA recognizes that the direction included herein may necessitate some adjustments to schedule.

#### **Hit/No Hit Identification**

***Pooled Endpoints:*** Toxicity test evaluations should consider the combined results of growth and survival for each test species (i.e., a sample should be considered toxic if the results for either survival or growth are determined to be toxic), as well as the results of both tests combined. It is EPA's assumption that LWG is likely evaluating every test endpoint separately – *Hyaella* growth and mortality and *Chironomid* growth and mortality. While evaluating the two survival endpoints separately is acceptable, we would place little weight in looking at growth as separate endpoints, due to the confounding effects between mortality and growth. However, it is also our understanding that the LWG's consultants are using the same approach as EPA in evaluating toxicity test endpoints: combining growth and survival into a single result for each species and, in addition, combining the *Hyaella* and *Chironomus* results. EPA is supportive of this approach.

***Control-Normalization:*** Control-normalized responses for survival and growth endpoints should be calculated as test response/control response (T/C). Using a control-normalized approach provides for more consistency in comparisons among batches and does not give additional slack to tests with poor control performance.

#### ***Hit/No Hit Toxicity Thresholds:***

Please include the following toxicity thresholds in your evaluation of predictive models:

- 1) < 90% control-normalized survival OR < 90% control-normalized growth
- 2) < 80% control-normalized survival OR < 80% control-normalized growth
- 3) < 70% control-normalized survival OR < 70% control-normalized growth

Only samples statistically different from controls should be considered to be below the toxicity threshold. Samples below the threshold and not statistically different from control should be evaluated for adequate power. Samples with insufficient power should be excluded from the analyses.

Toxicity thresholds should be evaluated for the combined *Hyaella* survival and growth, the combined *Chironomus* survival and growth, and the results of both tests combined.

EPA and its partners believe that, because most results fall between 10 and 30 percent, adding an additional level here rather than at 50 percent, as proposed by LWG, will provide for a better analysis of magnitude of effects.

### **Reporting**

Please provide an electronic data table listing the statistical results for all samples for each toxicity test endpoint, including an identification of samples with insufficient statistical power. Please also provide a detailed description of the approach used to determine statistical significance.

### **Detections for Inclusion in the Model**

The LWG has proposed a minimum of 30 detections before a contaminant is included in the model. This number was fine with the group, but additional information should be provided on the contaminants dropped from the analysis to better understand patterns in toxicity separate or in conjunction with modeling efforts. Additional information on these chemicals should be provided including:

- A list of contaminants detected in sediment, but not included in the model (detected fewer than 30 times).
- Map areas where these chemicals were detected to provide information on where these detections are in the harbor.
- Discussion of physical properties (e.g. VOCs) – this may link with groundwater plumes or other lines of evidence available.
- Potential correlation with false positive results from modeling effort.

### **Data Qualifiers**

EPA seeks clarification on the “N” qualifier. Specifically, what does this mean and is it appropriate to remove these?

### **Data Chemistry Preparation**

**TPH:** It is unclear how TPH is being handled in the model. We need a response on if TPH was analyzed, and if so, what it is being called in the database. Is oil and grease included in the residual range?

**Normalization:** Normalization of organic chemical concentrations to organic carbon is not required. Consider normalizing to percent fines or developing an alternative approach to evaluating the impact of the amount of fine-grain sediment on the predictive models. A separate model may need to be developed for fine grained sediments, which can then be compared to the larger model and differences can be compared.

### **Deliverables**

We would like to see an interim deliverable so that we can ensure we are on the same page on these issues before the report is submitted.